A0 Assignment – ESE516-SPRING 2019

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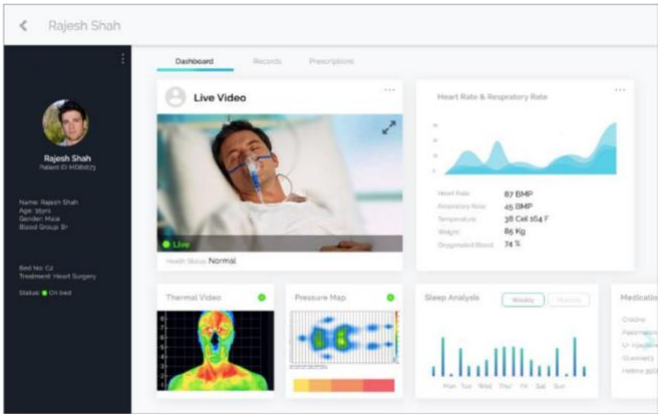
Device Description

In developing countries, the patient monitoring systems used in hospitals are not holistically designed compare to the type of monitoring necessary for the patient's healthcare. The monitoring systems are manual and thus requires time to time check-ups. With increasing number of patients and less availability of resources, hospitals are facing a problem in efficient monitoring system. It is difficult to monitor patient's health patterns and analyze them. The quality of sleep can be an early indicator of dementia and serious health conditions including adverse reactions to medications, depression and stress. Moreover, some of the vital parameters are really important for early diagnosis of certain medical conditions and understand health status.

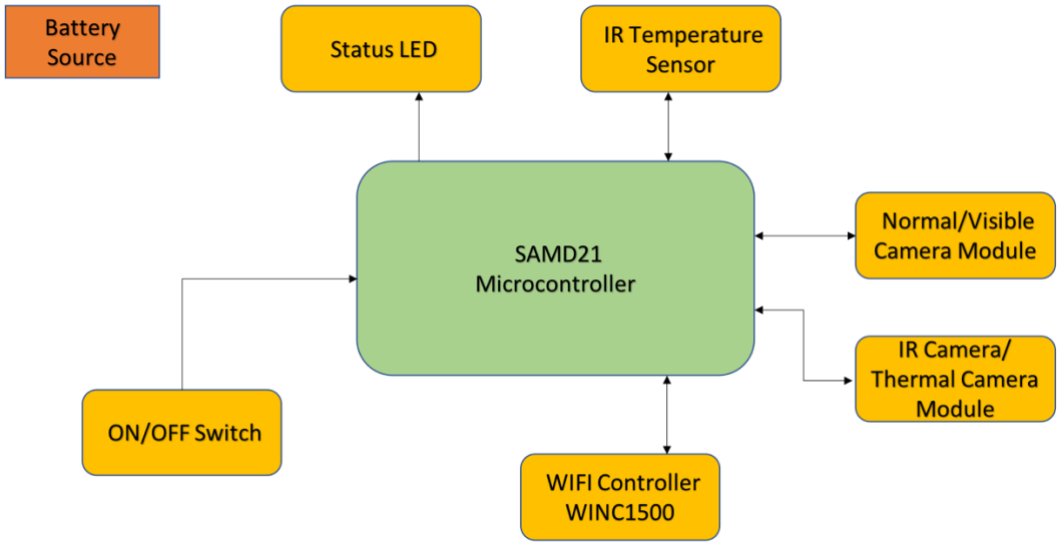
The designed IOT device "SmartEye" monitors patient's sleep, resting pattern, body thermal map and body temperature in real time, in a non-contact way without any wires and devices attached to patients' body. The system provides patient's real time temperature, video analysis and thermal analysis. The information from the SmartEye can be accessed and analyzed from the monitoring room or on mobile device application. The ability to track patient's movement and position non-invasively and monitor them remotely with mobile or desktop applications makes great sense to improve both safety and vigilance. The data received from the product can be analyzed for proper treatment of patient and hospital logistics.

The IOT product SmartEye uses electronic sensors like IR sensor, visible and IR camera module, processing and wireless transmission unit and computational imaging techniques. The patient's data are acquired using sensor modules and processed using microcontroller (SAMD21). The data is transmitted using WIFI Chip (WINC1500) and internet to personal device or user interface. Though thermal imaging and image analysis is not in widely in practice in medical field before because of only recent development of thermal imaging devices techniques. There is huge scope medical diagnosis by analyzing thermal images and data mining.

Basic Interaction interface of SmartEye



Simple System Diagram



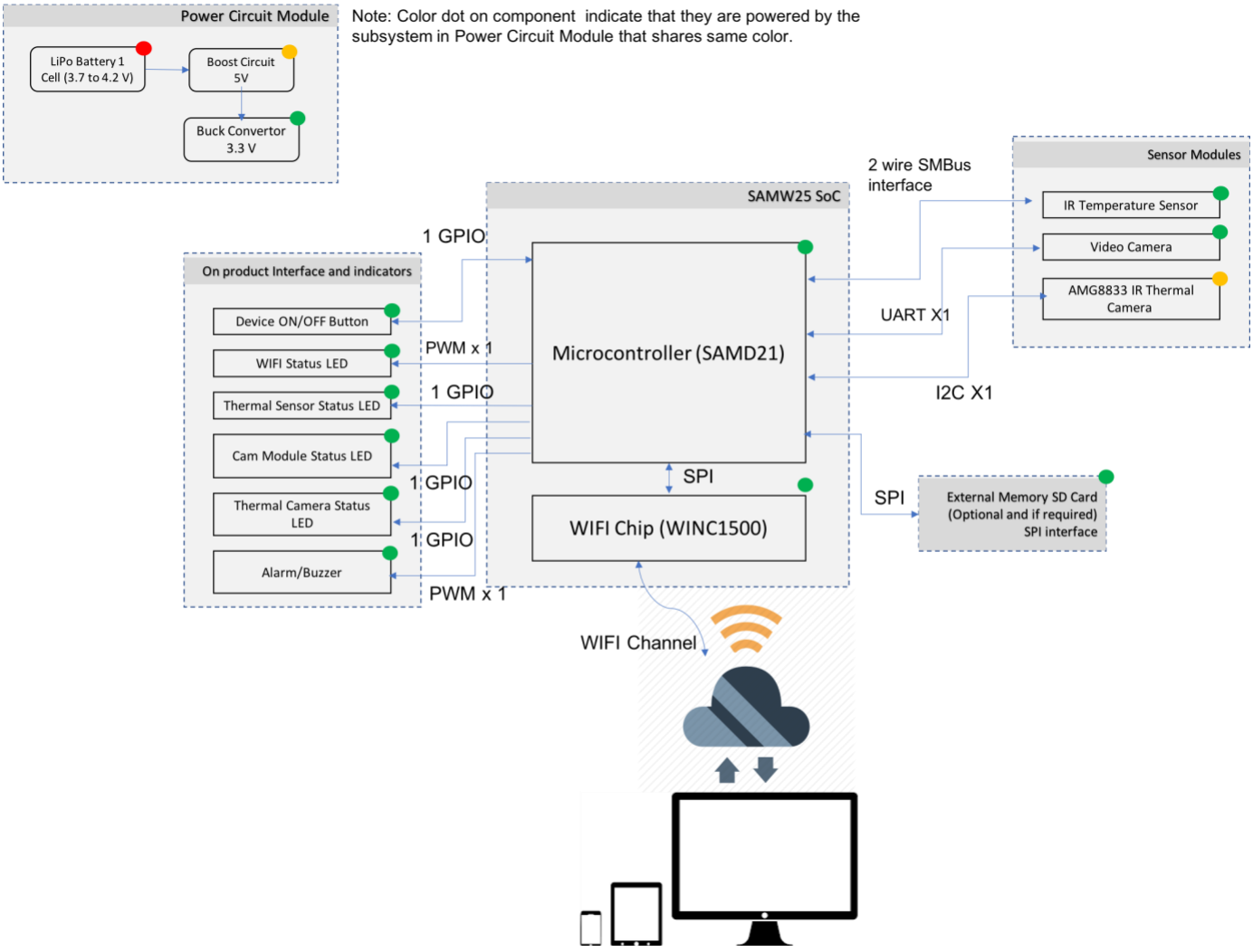
Device Investigation and Bill of Materials

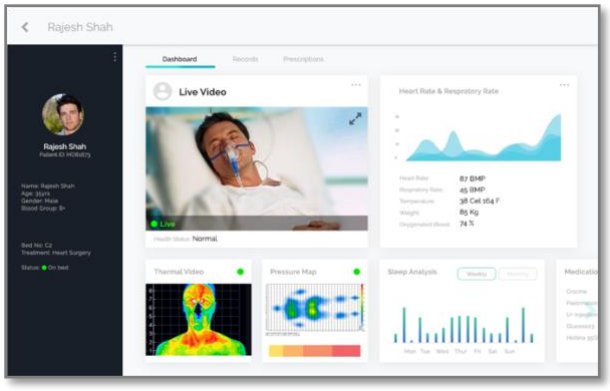
The excel file having bill of material with its description and links to datasheets is attached with submission.

SmartEye - Smart Patient Monitoring

Component	Manufacturer Part Number	Manufacturer	Digikey	Voltage(Min)	Volatge (Max)	Interface to MCU	Qty	Cost of QTY1	Cost QTY 1|k	Comments	D
MCU and WiFI	ATSAMW25H18-MR210PB1952	Microchip A	ATSAMW25H18-MR210PB1952-ND	2.7V	4.3V	NA	1	12.05	10.92	ESE516 MCU and WiFi SoC	h
Infrared Thermometer - MLX90614	MLX90614ESF-BAA-000-TU	Melexis Technologies NV	MLX90614ESF-BAA-000-TU-ND	2.6 V	3.6 V	2-wire SMBus interface	1	14.83	12.47		h
CMOS Camera Module 1	101020000	Seeed Technolc	1597-1077-ND	3.5V	5V	UART	1	32.78	32.78	Option 1	
Mini Spy Camera	PRODUCT ID: 3202		Available on Adafruit	3.7V	5V	UART	1	12.5	10	Option 2	h
Thermal Camera	AMG8833	Panasonic Elect	P19002CT-ND	3 V	5 V	I2C	1	32.5	22.9		h
								92.16	79.07	Total with Camera option 1 in USD	
								71.88	56.29	Total with Camera option 2 in USD	
								59.38	46.29	Without Video Camera Module	

Detailed System Diagram





User interface at mobile device or desktop for smart patient monitoring.